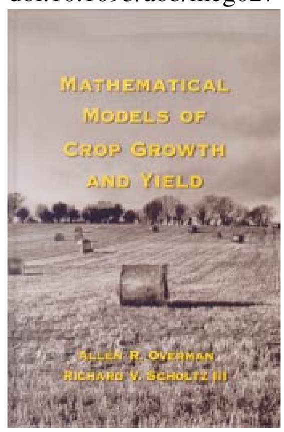
doi.10.1093/aob/mcg027



Mathematical models of crop growth and yield.
Overman AR, Scholtz RV III. 2002.
New York, Basel: Marcel Dekker AG.
$150 (hardback). 328 pp.

This book comprises six chapters: Introduction (34 pp.), Seasonal response models (60 pp.), Growth response models (91 pp.), Mathematical characteristics of models (97 pp.), Pasture systems (22 pp.) and Nonlinear regression for mathematical models (20 pp.). Each chapter ends with exercises and references. The book has a subject index.

I found the book perplexing for numerous reasons. The preface is signed by the first author alone, with acknowledgement of the second author. A different chapter order might have been more logical. Parts of the book are almost autobiographical and, perhaps as a consequence of this, appeared repetitive and unfocused. There is much self-reference, and not enough to others who have contributed to growth functions and growth analysis. The approach is highly empirical, which has its merits, but the authors suggest several times — and wrongly — that they are not just 'curve fitting'. There is hardly a mention of mechanistic models of crop growth and yield, which is often the method of choice nowadays. Of the 104 figures, 98 present data alongside fitted equations. There is mention of the Schrödinger equation, the harmonic oscillator and hermite polynomials, with reference to some of the iconic names of physics. Much of this seemed of doubtful relevance.

The models applied are mostly the familiar growth equations: polynomial, exponential, hyperbolic, Mitscherlich (or monomolecular) and logistic. The use of the error function as a growth equation was new to me. It worked well as a sigmoidal growth equation; its main drawback is that it defies the type of interpretation available for some of the other growth equations. Here it is presented as a three-parameter equation. A four-parameter form can easily be devised in which initial dry mass, final dry mass, and the position and sharpness of the sigmoidal region are all independently specified; this may be of greater utility.

Exercises can be of great value. Chapters 3 and 4 contained 37 and 48 pages of exercises, respectively. These were mostly concerned with fitting growth equations to tabular data, and they rarely illuminated or extended the text.

The first two sentences of the preface state: 'This book is intended to outline an approach to crop modeling (*sic*) that I have found to be both mathematically solid and feasible to use in practice. My strategy is to develop the technical details in a way that offers some insight into a logical progression from a simple idea towards more complex details.' The mathematics is elementary but entirely appropriate and, as far as I worked through it in detail, correct. The method is feasible to use in some practical situations, but is rarely used today because of its limitations—each application is unique and generalization is difficult. I had little sense of 'a logical progression'.

Who is the intended readership? Students can find review articles or chapters in books which are more accessible, shorter and cheaper. Researchers, who have already read such material, will learn little new here. The book is beautifully produced and printed, with well-laid-out equations and carefully annotated figures and tables. Regrettably, I cannot recommend the book to students or researchers, especially given the price.

John H. M. Thornley